PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Satoshi YAMAMOTO et al. Group Art Unit: 1791

Application No.: 10/567,096 Examiner: M. ORLANDO

Filed: February 21, 2006 Docket No.: 126840

For: LASER-TRANSMISSIBLE RESIN COMPOSITION AND METHOD FOR LASER WELDING USING IT

DECLARATION UNDER 37 C.F.R. §1.132

I, Osamu NAKAGAWA, a citizen of Japan, hereby declare and state:

1. I graduated from FUKUSHIMA National College of Technology in JAPAN, Department of Industrial Chemistry in March 1991.

2. I have been employed by Orient Chemical Industries Ltd., the assignee of the above-identified application, since April 1991 and where I have been engaged in chemical analysis, product inspection, and so on. Since October 2001, I have been engaged in research and development relating to colorants and polyolefin resin materials for laser transmission welding.

3. I am a member of the Japan Society of Polymer Processing.

4. My publications include the following works in this field: Laser Transmission Welding of Colored Polyolefin Thermoplastics Elastomer, "Keikei-Kakou '05 JSPP '05 Tech. Papers" pp125-126, and my public appearances include speaking on "Laser Transmission Welding of Colored Polyolefin Thermoplastics Elastomer" before the symposium of Japan Society of Polymer Processing held during June 8 to 10, 2005.

5. I am a named inventor in the above-captioned patent application.

6. I have a professional relationship with the Assignee of the above-identified patent application. In the course of that professional relationship, I received compensation directly from the Assignee for my work relating to research and development relating to colorants and polyolefin resin materials for laser transmission welding. I am being compensated for my work in connection with this Declaration.

7. I and/or those under my direct supervision and control have conducted the following tests:

EXPERIMENTAL RESULTS

The following two experiments were performed:

Experiment I: A composition including 0.5% of JR405 in PP-Block_BC05B using surface-treated titanium oxide with aluminum; and

Experiment II: A comparative composition including 0.5% of JR in PP-Block_BC05B using non-surface-treated titanium oxide were prepared as shown below.

Experiment I

1000g of polypropylene resin (catalog No. BC05B, Japan Polypropylene Corporation) and 6 g of JR405 (TAYCA Co.,Ltd.), which is surface-treated titanium oxide with aluminum having an average particle size of 210 nm and the density of 4.1 g/cm^3, were added in a tumbler made of stainless steel and mixed with stirring for 1 hour to prepare a laser-transmissible resin composition. The obtained composition was executed by injection molding at 200°C cylinder temperature and 35°C metal mold temperature with general procedures using an injection molding machine (catalog No.Si-50, Toyo Machinery & Metal Co., Ltd.) to manufacture a test piece (I) of a plate as a laser-transmissible resin workpiece having length of 78mm, width of 48mm and thickness of 2 mm with a proviso of the end portion having thickness of 1 mm and length of 39 mm from the edge by lacking the under

side thereof. The surface and the appearance thereof were regular and exhibited the hue of white uniformly.

Experiment II

1000g of polypropylene resin (catalog No. BC05B, Japan Polypropylene Corporation) and 6g of JR (TAYCA Co.,Ltd.), which is non-surface-treated titanium oxide having an average particle size of 270 nm and the density of 4.2 g/cm^3, were added in a tumbler made of stainless steel and mixed with stirring for 1 hour to prepare a laser-transmissible resin composition. The obtained composition was executed by injection molding at 200°C cylinder temperature and 35°C metal mold temperature with general procedures using an injection molding machine (catalog No.Si-50, Toyo Machinery & Metal Co., Ltd.) to manufacture a comparative test piece (II) of a plate as laser-transmissible resin workpiece having length of 78 mm, width of 48 mm and thickness of 2 mm with a proviso of the end portion having thickness of 1 mm and length of 39 mm from the edge by lacking the under side thereof. The surface and the appearance thereof were regular and exhibited the hue of yellowish.

Determination of Transmissivity

Test piece (I) and the comparative test piece (II) were each analyzed with a spectrophotometer (catalog No. V-570; JASCO Corporation). The transmissivity of the portion with the thickness of 2 mm of the stair was determined by irradiating laser having the wavelength ranging from 380 to 1200 nm. The results of the transmissivity thereof under the wavelength of 940 nm of the semiconductor laser are shown below.

Determination of Reflectance

Test piece (I) and the comparative test piece (II) were each analyzed with a spectrophotometer (catalog No. V-570; JASCO Corporation). The reflectance of the portion with the thickness of 2 mm of the stair was determined by irradiating laser having the

wavelength ranging from 380 to 1200 nm. The results of the reflectance thereof under the wavelength of 940 nm of the semiconductor laser are shown below.

Determination of Whiteness Degree

The L-value, a-value and b-value of L*a*b* color specification at the portion with the thickness of 2 mm of the stair of each test piece or comparative test piece were determined by a color difference meter (catalog No.SC-T, Suga Test Instruments Co. Ltd.). The whiteness degree: W_1 was calculated by the following expression (I). The results are shown below.

$$W_1 = 100 - \sqrt{(100 - L)^2 + (a^2 + b^2)} \quad \cdots \quad (I)$$

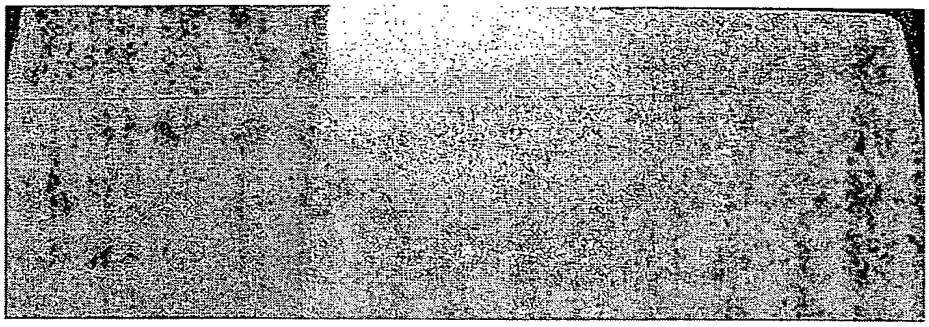
Control: Composition including PP-Block_BC05B

Additionally, the transmissivity and the reflectance of a control test piece of natural resin (manufactured as similar as Experiment I except for using no titanium oxide) are determined under the conditions set forth above. The results for test piece I, comparative test piece II, and control test piece are shown below in Table A.

TABLE A

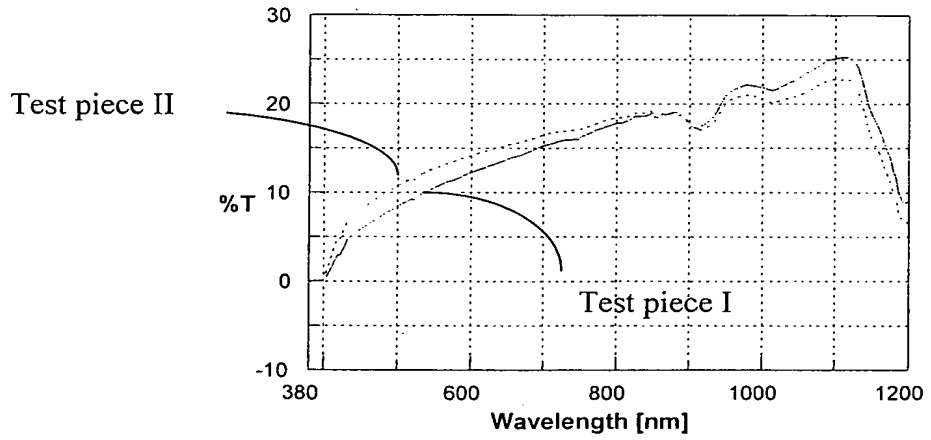
Test Piece	Experimental Parameters		Optical Property under 940nm (n=5) upper: Mean (bottom: Deciation)		Whiteness Degree 2mm thickness upper: Mean (bottom: Deciation)			
	Composition	Amount of Titanium oxide	Reflec-Tance R%/2mm	Trans-missivity T%/2mm	*D65-2, ϕ30mm			
					L	a	b	W
I	0.6% of JR405 in PP-Block_BC05B	0.6%	68 (0.2)	20 (0.3)	91.4 (0.03)	-1.4 (0.01)	1.3 (0.01)	91.2 (0.03)
II	0.6% of JR in PP-Block_BC05B	0.6%	66 (0.3)	18 (0.2)	88.1 (0.09)	-1.4 (0.01)	3.5 (0.02)	87.5 (0.09)
Control	PP-Block_BC05B	0%	17 (0.2)	53 (1.2)				

As shown in the Table A (above) and picture (below), the surface and the appearance of the test piece I exhibited the hue of snow-white compared to the control and test piece II. Furthermore, the surface and the appearance of the test piece II exhibited a slight yellowish hue. Therefore, test piece I is preferable in terms of design of appearance.



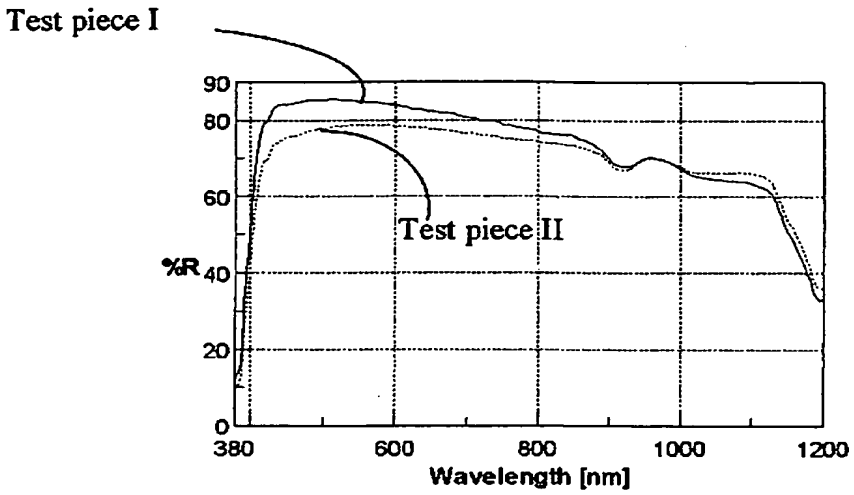
(control) (test piece I) (test piece II)

Chart 1



As shown in the above chart 1, compared to comparitive test piece II, the transmissivity of the test piece I under the visible ray is small. Therefore, the masking effect and the whiteness degree are effective. On the other hand, the transmissivity thereof under wavelength of the laser region is high in comparison.

Chart 2



As shown in the above chart 2, compared to the comparative test piece II, the reflectance of the test piece I under the visible ray is high. Therefore, the masking effect and the whiteness degree are effective. On the other hand, the reflectance thereof under the wavelength of the laser region is low, and thus the appearance by the visible observation is well.

Additionally, due to the large transmissivity of the laser, the test piece I is preferable as a whitish resin composition for laser welding compared to the test piece II.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: August 6, 2008

Osamu NAKAGAWA

Osamu NAKAGAWA